

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CONSERVATION CROP ROTATION (ACRE)

CODE 328

DEFINITION

Growing crops in a recurring sequence on the same field.

PURPOSES

This practice may be applied as part of a conservation management system to support one or more of the following:

- Reduce sheet and rill erosion.
- Reduce soil erosion from wind.
- Maintain or improve soil organic matter content.
- Manage the balance of plant nutrients.
- Improve water use efficiency.
- Manage saline seeps.
- Manage plant pests (weeds, insects, and diseases).
- Provide food for domestic livestock.
- Provide food and cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land where crops are grown, except:

This standard does not apply to pastureland, hayland, or other land uses where crops are grown occasionally only to facilitate renovation or re-establishment of perennial vegetation.

CRITERIA

General Criteria Applicable To All Purposes

Crops shall be grown in a planned, recurring sequence as outlined in Plans and Specifications.

Crops shall be adapted to the climatic region, the soil resource, and the goals of the producer. Adapted crops and varieties, listed in **Montana State University Cooperative Extension Service** publications or other approved sources, shall be selected.

A conservation crop rotation may include crops planted for cover or nutrient enhancement.

Crops shall be selected that produce sufficient quantities of biomass at the appropriate time to reduce erosion by water or wind to within acceptable soil loss levels. In those instances where crops selected do not produce sufficient biomass to meet this criteria, a cover crop or other appropriate practices shall be used. See **Field Office Technical Guide (FOTG), Section IV, Practice Standard 340–Cover Crop**. The amount of biomass needed shall be determined using current approved erosion prediction technology. Soil loss estimates shall account for the effects of other practices in the conservation management system.

A conservation crop rotation is a combination of crops that compliment each other to prevent disease, weeds, and insect infestations, and maximizes production, profitability, and soil quality. Utilize the Crop Diversity Index (ref. Montana Agronomy Technical Note No. 150.14, Crop Rotation Intensity Rating and Diversity Index dated September 2001) to generate a relative indication of adequate crop rotation diversity.

NRCS, MT
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Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard contact the Natural Resources Conservation Service.

NOTE: This type of font (AaBbCcDdEe 123..) indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123..) indicates Montana Supplement.

Additional Criteria To Maintain Or Improve Soil Organic Matter Content

Crops shall be selected that produce the amount of plant biomass needed to maintain or improve soil organic matter content, as determined using the Soil Conditioning Index procedure. See **Montana Agronomy Technical Note MT-150.13, Soil Conditioning Index (SCI) Calculations dated 2001**. The amount of plant biomass needed to achieve the desired soil condition shall be determined on a field-by-field basis. Organic matter content will be considered maintained or improved if the SCI results in a 0.0 or greater integer.

If partial removal of residue by means such as baling or grazing occurs, enough residue shall be maintained to achieve the desired soil organic matter content goal.

Cover and green manure crops planted specifically for soil improvement may be grazed, as long as grazing is managed to retain adequate biomass.

Long term annual burning of crop residue is detrimental to soil organic matter. Burning of crop residue is allowed only when the SCI for the rotation reflects a 0.0 or higher integer.

Additional Criteria To Manage the Balance of Plant Nutrients

Crop selection and sequence shall be determined using the nutrient balance procedure and specification found in **FOTG, Section IV, Practice Standard and Specification, 590–Nutrient Management**.

When crop rotations are designed to add nitrogen to the system, nitrogen-fixing crops shall be grown immediately prior to or interplanted with nitrogen-depleting crops.

To reduce excess nutrients, crops or cover crops having rooting depths and nutrient requirements that utilize the excess nutrients shall be grown.

Additional Criteria To Improve Water Use Efficiency

Selection of crops and varieties, sequence of crops, or the annual decision to plant a crop or to fallow, shall be determined using the procedures outlined in **Montana Agronomy Technical Note**

110.4, Determining Plant Available Soil Moisture dated September 2001. The level of water use by a cropping system should match the water available under "normal" conditions. Utilize the **Crop Rotation Intensity Rating (ref. Montana Agronomy Technical Note No. 150.14, Crop Rotation Intensity Rating and Diversity Index dated September 2001)** to assess the relative potential for soil water storage and crop water use.

Additional Criteria To Manage Saline Seeps

Crops grown in the recharge area of saline seeps shall be selected for rooting depths and water requirements adequate to fully utilize all plant available soil water. Summer fallow will not be used if soil moisture levels are adequate to raise a crop. See **FOTG, Section IV, Practice Standards and Specifications, 328-B Conservation Crop Rotation—Flexible Cropping**. Crop selection and sequence shall be determined using an approved water balance procedure. If a crop is not planted for economic reasons, a cover crop, green manure crop, or other vigorous plant growth must be planted to utilize excess soil moisture.

If excess subsoil moisture exists below the rooting depth of crops commonly grown in the recharge area, deep-rooted perennial crops shall be established for the number of years needed to dry the soil profile.

Crops grown in the discharge area of saline seeps shall be selected for their tolerance to salinity levels in the discharge area.

Additional Criteria To Manage Plant Pests (Weeds, Insects, Diseases)

Crops shall be alternated to break the pest cycle and/or allow for the use of a variety of control methods. Affected crops and alternate host crops shall be removed from the rotation for the period of time needed to break the life cycle of the targeted pest.

Resistant varieties, listed in appropriate university publications or other approved sources, shall be selected where there is a history of a pest problem.

Additional Criteria To Provide Food For Domestic Livestock

Crops shall be selected to balance the feed supply with livestock numbers. The needed amount of

selected crops shall be determined using an approved forage-livestock balance procedure.

Additional Criteria To Provide Food and Cover For Wildlife

Crop selection to provide either food or cover for the targeted wildlife species will be grown, managed, or left unharvested as per the needs of the targeted wildlife as determined by an approved habitat evaluation procedure and wildlife management plan.

CONSIDERATIONS

Growing a sequence of crops rather than always the same crop in the same field is possibly the most critical factor affecting the health and productivity of a future crop. Production yields are determined as much by what was grown—or not grown—in the same field the previous two or three years as by the management of the current crop.

Fallow is primarily used for two reasons, to control pests and to enhance soil moisture. Fallow allows for concentrated control of some pests not always possible when growing a crop (tillage and/or herbicide application). However, intensive tillage may cause excess erosion degrading the soil resource. Fallow may also accelerate salinity problems by not utilizing excess soil moisture.

When used in combination with FOTG, Section IV, Practice Standards and Specifications, 589B—Cross Wind Stripcropping, or 585—Stripcropping Contour, the crop sequence should be consistent with the stripcropping design.

When used in combination with FOTG, Section IV, Practice Standards and Specifications RESIDUE MANAGEMENT, selection of high residue producing crops and varieties, use of cover crops and adjustment of plant population and row spacing can enhance production of the kind, amount, and distribution of residue needed.

Where maintaining or improving soil organic matter content is an objective, the effects of this practice can be enhanced by managing crop residues, tillage practices, utilizing animal wastes, or applying mulches to supplement the biomass produced by crops in the rotation.

Where excess plant nutrients or soil contaminants are a concern, utilizing deep rooted crops or cover crops in the rotation can help recover or remove the nutrient or contaminant from the soil profile.

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Where precipitation is limited, seasonal or erratic moisture can be conserved for crop use by maintaining crop residues on the soil surface to increase infiltration and to reduce runoff and evaporation. Where winter precipitation occurs as snow, additional moisture can be obtained for crop use by trapping snow with standing residue, windbreaks, or other barriers. **To be most effective in trapping snow, crop residues should be cut in a scalloped pattern, i.e., one header width of stubble is cut at 12 inches, the next is cut at 8 inches, the next is cut at 6 inches, etc.**

Where improving water use efficiency on deep soils is a concern, rotating or combining deep-rooted crops with shallow rooted crops can help utilize all available water in the soil profile.

Crop damage by wind erosion can be reduced with this practice by selecting crops that are tolerant to abrasion from wind blown soil or tolerant to high wind velocity. If crops sensitive to wind erosion damage are grown, the potential for plant damage can be reduced by crop residue management, field windbreaks, herbaceous wind barriers, intercropping, or other methods of wind erosion control.

Where pesticides are used, consider application methods and the crop rotation to avoid negative impacts on the following crop due to residual herbicides in the soil or adverse effects on aquatic wildlife or habitat through runoff. **Proper crop rotation will reduce populations of soil- and residue-inhabiting pests. Monocultures of any crop will enrich populations of pests and diseases and may adversely increase certain weeds that cannot be controlled by selective herbicides.**

Soil compaction can be reduced by adjusting crop rotations to include deep rooted crops that are able to extend to and penetrate the compacted soil layers, as well as avoiding crops that require field operations when the soils are wet.

Leaving several rows unharvested around the edges of the field will provide protection and/or food for overwintering wildlife.

Crop plantings may be developed to benefit particular communities, species or life stages of wildlife. Food plots or crops for wildlife could be provided as part of a habitat restoration project as

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Crop plantings may be developed to benefit particular communities, species or life stages of wildlife. Food plots or crops for wildlife could be provided as part of a habitat restoration project as an initial food and cover source for wildlife until food and cover producing vegetation becomes established.

Producers should be made aware of the potential affects recropping may have on crop insurance/risk management benefits when deciding to recrop.

Crop residues may be a valuable food source for wintering wildlife where winter browse is sparse.

Careful consideration should be given to pesticide use if applied to crops raised for wildlife.

This practice has the potential to have either a positive or negative affect on National Register listed or eligible (significant) cultural resources (archeological, historic or traditional cultural properties). Care should be taken, especially during site preparation and maintenance, to avoid adverse effects to these resources. Follow NRCS state policy for considering cultural resources during planning and maintenance.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard. Specifications should include the sequence of crops to be grown, length of time each crop will be grown and total length of rotation.

Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

The following items shall be considered when planning the practice. Those items marked with an asterisk shall be recorded as minimum documentation requirements for an applied practice:

1. **Location.***
2. **Extent in Acres.***
3. **Crop rotation or sequence.***
4. **Soil loss prediction before and after.***

5. **Nutrient management.**
6. **Pest—weed, disease, insect—management**
7. **Specification for annual cropping, flexible cropping, flexible legume-cereal cropping or crop-hayland rotations.***
8. **Cropland Rotation Intensity Rating.**
9. **Diversity Index.**
10. **Soil Conditioning Index.***

OPERATION AND MAINTENANCE

Rotations shall provide for acceptable substitute crops in case of crop failure or shift in planting intentions for weather related or economic reasons. Acceptable substitutes are crops having similar properties that meet the criteria for all the resource concerns identified for the field or treatment unit.

In areas where summer fallow is practiced, the decision to plant a crop or fallow shall be made annually based on soil moisture at planting time. Fields shall be fallowed only when soil moisture is not adequate to produce a crop. If moisture supply is adequate but limited, short-season shallow-rooted crops shall be selected and grown. **Producers need to recognize potential affects recropping may have on crop insurance/risk management benefits when deciding to recrop.** Deep-rooted crops shall follow shallow-rooted crops in subsequent years, if needed, to utilize all plant available water in the root zone.

REFERENCES

Crop Rotation Intensity Rating and Diversity Index. USDA–NRCS Montana. Agronomy Technical Note 150.14 dated September 2001.

Soil Conditioning Index. USDA–NRCS Montana. Agronomy Technical Note 150.13 dated September 2001.

Determining Plant Available Soil Moisture. USDA–NRCS Montana. Agronomy Technical Note 110.4 dated 2001.

Burning- Effects on Soil Quality. USDA–NRCS Montana. Agronomy Technical Note 150.16 dated October 2001.

